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Г.Л.КАЗИМИРСКИЙ, Т.В.ПРОТОПОПОВА

АНГЛИЙСКИЙ ЯЗЫК

ПРАКТИЧЕСКОЕ ПОСОБИЕ для студентов
специальности 1-33 01 02 «Геоэкология»

Гомель
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Практическое пособие ставит своей целью оказание помощи студентам в овладении специальной лексикой и навыками перевода текстов по специальности. Разноплановые тексты и задания помогут овладеть навыками не только письменной но и устной речи. Адресовано студентам 1 курса специальности 1- 33 01 02 «Геоэкология».

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ВВЕДЕНИЕ

Предлагаемое практическое пособие по английскому языку предназначено для работы со студентами 1 курса геолого-географического факультета специальности экология.

Данное практическое пособие содержит тексты для чтения и тексты для пересказа. Весь текстовый материал подобран из оригинальных периодических изданий с учетом возрастных особенностей и интересов студентов.

Первый раздел пособия включает в себя тексты для чтения, а также послетекстовые лексические упражнения к ним. Тексты содержат новый материал и предназначены для изучающего чтения. В задачу упражнений входит постановка правильного чтения, изучение и усвоение новой лексики. На базе текстов формируются навыки и умения ознакомительного просмотрового и поискового видов чтения. Также данные тексты помогут развивать умения чтения текста не только по словам, а по синтагмам: поиск главной и необходимой информации в тексте; анализ важных деталей; просмотр текста целиком для осмысления основного содержания прочитанного; а также реферирования текста. На формирование этих умений направлена система послетекстовых упражнений.

Также одной из целей работы с текстами является обучение навыкам и умениям пересказа, а именно:

1. принимать и удерживать в памяти информацию;
2. членить текст на смысловые части, определять факты;
3. устанавливать логические связи между частями текста;
4. определять главное от второстепенного, удерживать в памяти это главное;
5. выделять главную мысль сообщения.

Развитию вышеперечисленных умений и навыков будет способствовать текстовый материал второго раздела с тестовой проверкой понимания. Практическое пособие может быть использовано как для самостоятельной работы, так и при подготовке к занятиям по английскому языку. Широкая тематика текстов делает возможным использование их не только со студентами экологической специальности, но и со студентами географической специальности.

MARS

Mars, of all the planets, has surface conditions most similar to those on the earth. The atmosphere is extremely rarified consisting of carbon dioxide in a thin film (envelope) near the surface, conditions are more like those of the moon than of the earth, fluctuating from below 0° at night to 130-150^0 in sunlight

Photos taken by *Mariner IV*, a 1964 probe, and *Mariners VI* and *VII* in 1969 revealed that the surface of Mars resembles closely that of the moon, with nearly all surface irregularities consisting of meteoric impact craters. The crater rims (edge) are not so high or so rugged as on the moon, and there are no fissure cracks or winding valleys as are found on the lunar surface. Local relief generally is less than 1000 feet. There is evidence of slightly greater weathering and material transport on the Marxian surface than on the moon, but landforms typical of terrestrial deserts are totally absent despite (in spite of) the aridity of the surface environment. The waxing and waning (increase and decrease) of the white polar caps indicate a distinct hemispherical seasonal temperature variation, as on earth. There is little sign of daily changes in the margins of these polar caps; however, which indicate that they are fairly deep. It is now believed that they are composed of frozen carbon dioxide.

Despite some seasonal changes in colouration on the surface that are believed to have been the result of some low life forms, no chlorophyll has been detected, and there is only the slightest trace of water vapor. The virtual absence of free oxygen and nitrogen probably preclude (prevent) the existence of life forms similar to those on earth. The lack of a distinct magnetic field and the sparse (rarified) atmosphere tend to expose the Martian surface to dangerous cosmic and solar radiation and proton bombardment.

Ex. 1 Give brief answers.

1. What planet has surface conditions most similar to those on the earth? 2. Has Mars atmosphere? 3. What does it consist of? 4. What are temperature fluctuations on Mars? 5. When were the fire photos of Mars taken? 6. What is the relief of Mars? 7. Are the crater rims of Mars as high and rugged as those

on the moon? 8. is weathering and material transport on the Martian surface similar to those on the moon? 9. What does the waxing and waning of the white polar caps indicate? 10. Is there any evidence of life on Mars? 11. What precludes (prevents) the existence of life on Mars?

Ex. 2 Answer in complete sentences.

1. What are the surface conditions of Mars? 2. What did photos taken by Mariners reveal? 3. In what way do crater rims of Mars differ from those on the lunar surf ace? 4. What is the evidence of seasonal temperature variation on Mars? 5. What makes us believe that the polar caps are fairly deep? 6. What is the composition of the polar caps? 7. What do some seasonal changes in colouration suggest? 8. Why is the Martian surface exposed to cosmic and solar radiation and proton bombardment?

Ex. 3 Paraphrase the following.

1. Mars has surface conditions *closely resembling* those on the earth. 2. The Martian atmosphere consists of a thin *envelope* of carbon dioxide near the surface 3. Landforms typical to terrestrial deserts are totally absent on the Martian surf ace *in spite of* the aridity of the surface environment. 4. The *absence* of a distinct magnetic field and the *rarified* atmosphere tend to expose the Martian surface to dangerous cosmic and solar radiation.

Ex.4 Guess the meanings of the italicized words

1 a) No *chlorophyll* has been detected on Mars. b*) Material transport* on the Martian surface is slightly greater than on the moon. c) The absence of a distinct *magnetic* field and the rarified *atmosphere* tend to expose the Martian surface to dangerous *cosmic* and solar radiation and *proton bombardment*.

2 a) In spite of some change in *colouration* on the surface of Mars no chlorophyll has been detected. b) As a result of excessive amount of sand, roads become *impassable*. c) Some of the lunar crates have *unmistakable* features of volcanoes.

3 a) There is a thin *film* of carbon dioxide near the Martian surface. b) *Predators* are animals that live by killing and eating other animals..

THE MOON

The Moon is the first nonterrestrial body to be visited by man. Long before the first Moon visit in 1969, astronomers and other scientists knew much concerning the Moon. Detailed photographs permitted it to be mapped with great precision (accuracy).

The Moon presents an exceedingly hostile environment to man. There is no atmosphere, no water, no life, no movement. Temperatures range from well over 150°F in full sunlight to "space cold" – near absolute zero – in the deepness of the lunar night. Level areas are rare, and the entire surface is pock-marked (covered) with circular craters ranging from tiny pits (holes) a few inches across to gigantic craters 50 to 70 miles in diameter and with rugged rims 6,000 feet high.

Most of these circular craters are believed to have been caused by the impact of meteors that must have had a wide range of sizes. Some of the larger craters, however, have unmistakable features of volcanoes, including distinct lava flows. Some of the high ridges do not seem to be related to volcanic or meteoric causes, but the general surface contains no pronounced separation into high continental blocks and low basins, as on earth.

The surface of the Moon is covered with loose, unconsolidated and unassorted debris of rock material that has solidified from a molten state. In spite of the great age of the lunar surface rock material (about 3 billion years), there is no trace of chemical alteration indicating that the great sterile environment of the lunar surface has not changed noticeably since the rocks were formed.

Among some of the puzzling (strange) features of the lunar surface are deep, sinuous chasms (widening canyons) and long, straight fissures that radiate from some of the larger plains. Analyses of rock samples (specimens) brought back to earth by the Apollo astronauts indicate:

1) a consistent great age of the surface material;
2) a common igneous origin (solidification from a molten state);
3) no new elements;
4) common chemical elements to those in rocks of the earth;
5) some metallic elements such as titanium that are more abundant than in the surface rocks of the Earth.

Ex. 1 Give brief answers.

1. When was the Moon first visited by man? 2. Did scientists know anything about the Moon before that? 3. Is there any atmosphere or water on the Moon? 4. What are the daily temperature variations on the Moon? 5. Is the relief of the Moon smooth? 6. What are the main relief features of the Moon? 7. Are the Moon craters big or small? 8. What material is the surface of the Moon covered with? 9. Is there any evidence of chemical alteration, or weathering? 10. What does it indicate? 11. Is the surface material of the Moon old or young? 12. What is the origin of the surface material? 13. Were any new chemical elements found on the Moon? 14. Are the chemical elements of the Moon similar to those on the earth crust?

Ex. 2 Answer in complete sentences.

1. When was the Moon mapped with great accuracy? 2. What is the Moon's environment? 3. What is the temperature range on the Moon? 4. What is the relief of the Moon? 5. What is the origin of the moon craters? 6. What is the general surface of the Moon compared with that of the Earth? 7. What is the surface material of the Moon composed of? 8. What are some of the puzzling features on the lunar surface? 9. What does analyses of rock samples indicate?

Ex. 3 Paraphrase the following.

1. Scientists knew much about the Moon a long *time before* the first visit to the Moon in 1969. 2. *Despite* the great age of the lunar surface material there is no trace of chemical changes. 3. Analyses of rock *specimens* of the Moon indicate the *same* chemical elements as those in rocks of the earth crust. 4. The general surface of the Moon contains no *marked* separation into high continents blocks and low basins as on earth.

Ex. 4 Guess the meaning of the italicized words.

1 a) *Detailed photographs* permitted the moon to be mapped with great *accuracy.* b) The surface of the moon is covered with *gigantic* craters 50 to 70 miles in *diameter.* c) *The* great *sterile* environment of the *lunar* surface has

evidently not changed noticeably since the rocks were *formed*. d) Long, straight fissures *radiate* from some of the lunar plains.

2 a) the is no trace of chemical *alteration* on the lunar surface. b) Some larger craters have *unmistakable* features of volcanoes such as distinct lava flows. c) The surface of the moon is covered with *loose, unconsolidated* debris composed of rock material that has *solidified.*

3 a) Analysis of rock *samples* brought back to the earth by the Apollo astronauts indicate a great age of the surface material. b) The surface of the moon is covered with circular craters ranging from tiny *pits* a few inches across, to gigantic craters.

MUD VOLCANOES

Mud volcanoes are a peculiar manifestation of certain forms of volcanism, but they are not always of volcanic origin. They comprise accumulations of mud in the form of flattened cone around the vent the mud being provided by clay formations at a greater or lesser depth underneath. Such cones may vary from 6 to 100 m in height with a basal diameter of 50 to 230 m.

In a desert climate that allows the mud to dry out quickly their flanks may have slopes of 30 to 40°. The mud is often mixed with sand and stones that are ejected at the same time.

Mud volcanoes are generally associated with gas vents, and the gas bubbles up through the pool of liquid mud in the crater. Sometimes the craters are aligned in rows, somewhat resembling fissure eruptions. The mud that comes to the surface is rendered liquid by admixture with water and is urged (forced) upwards by gas pressure.

The gas is sometimes of volcanic origin, as at Pozzuoli, near Naples; but other mud volcanoes are "paravolcanic" manifestations, found especially in regions that abound in hydrocarbons. In these cases it is petroleum or "natural" gas that causes the mud eruption, the mud being rendered fluid by admixture with saline water.

But earthquakes which set thixotropic reactions in motion are also responsible for mud eruptions. Lines of mud volcanoes mark the position of fractures and especially of active faults, which bring pressure to bear on deep-seated clay deposits.

Ex. 1 Give brief answers.

1. Are mud volcanoes of volcanic origin? 2. What do mud volcanoes comprise? 3. What is the shape of a mud volcano? 4. What is the height of a mud volcano? 5. Does mud come to the surface in a liquid or solid state? 6. What renders the mud volcano liquid? 7. What forces the mud upward? 8. What is the origin of this gas? 9. Are earthquakes responsible for mud eruption?

Ex. 2 Answer in complete sentences.

1. What is the origin of volcanoes? 2. What is mud provided by? 3. Do mud volcanoes comprise only mud? 4. Why do cones in desert climate have slopes of 30 to 40°? 5. What are mud volcanoes associated with? 6. What is the origin of gas in mud volcanoes? 7. Where do "paravolcanic" manifestations occur? 8. What do lines of mud volcanoes mark?

Ex. 3 Paraphrase the following sentences.

1. Sometimes the craters of mud volcanoes *occur in rows to a certain extent* resembling fissure eruptions. 2. Mud that comes to the surface is *made* liquid by *mixture* with water and is *forced* upwards by gas pressure. 3. Sometimes earthquakes *cause* thixotropic reactions. 4. Active faults *exert* pressure on clay deposits *located at great depths.*

Ex. 4 Guess the meaning of the italicized words.

1 a) Mud *volcanoes* comprise *accumulations* of mud in the *form* of flattened *cone* with a *basal diameter* of 50 to 230 m. b) *Petroleum* or **"***natural gas*" sometimes causes the mud eruption. c) Some mud volcanoes are Para volcanic *manifestations, found* especially in regions that abound in *hydrocarbons.* d) Earthquakes which set thixotropic *reactions* in motion are responsible for mud eruptions.

2 a) The mud is rendered liquid by *admixture* with water. b) Without the cleansing processes the earth would be *uninhabitable.* c) Lines of mud volcanoes mark the position of active faults, which exert pressure on *deep-seated* clay deposits. d) Plains of volcanic origin constitute thousands of feet of *successive* lava flows.

3 a) Mud volcanoes comprise accumulations of mud in the form of flattened cone around the *vent.* b) Mud volcanoes usually have a *pool* of liquid mud in the crater.

EXPLORATION OF THE MOON

From early time the Moon has roused the interest of mankind. However, it was not until the seventeenth century that scientists in the west concerned themselves more intensively with the Moon. Thus Galileo (1564-1642) was the first to observe the Moon through a telescope and he drew a rough map. Helius produced the first good map of the Moon's visible hemisphere in 1647. In 1837 an exact map of the Moon was produced.

The exploration and mapping of the Moon experienced a rapid development through the unmanned probes which photographed its surface. The first atlas of the far side of the Moon was published by the Russians. Today the visible side is recorded on maps of a scale of 1:1.000.000 with contour lines of 300 m as a result of the photographs obtained by the series of Luna-Orbiter flights.

The tectonic and geological survey of the Moon goes hand in hand with the topographic survey of both sides. The main interest of the scientists is concentrated on geological and astrophysical problems. The first men on the Moon, for instance, set up seismometers in order to discover whether the Moon still has magmatic activity inside or whether it has grown cold. The first seismograms seem to indicate that the Moon is still active.

From the geological point of view it is interesting to discover whether the Moon is built up of rocks similar to those on the Earth and whether these rocks are composed of similar minerals. The first analyses carried out by unmanned probes and transmitted to the earth showed rocks of basalt-like composition.

Up until now the geological exploration of the Moon was largely based on an analysis of the surface forms. The future geological exploration of the Moon will deal with lunar matter. The influence of cosmic radiation on a surface unprotected by an atmosphere will probably be one of the main areas of lunar research. The question of whether the Moon has workable deposits and whether they can be exploited for our experiments on earth may also have immense economic significance for future generations.

Ex. 1 Give brief answers.

I.Who was the first to observe the Moon? 2. When was the exact map of the Moon produced? 3. What device enabled scientists to make the first good map of the far side of the Moon? 4. Are the scientists concerned only with the topographic survey of the Moon? 5. What have seismometers set up by the first men on the Moon revealed? 6. What is the composition of moon rocks according to the first analyses? 7. What will the future geological exploration of the Moon deal with?

Ex. 2 Answer in complete sentences.

1. When did the exploration and mapping of the Moon experience rapid development? 2. What maps of the Moon are now available? 3. What is the main interest of the scientists concentrated on? 4. What was the purpose of the first seismometers set up on the Moon? 5. What are geologists interested in? 6. What was the geological exploration of the Moon based upon until now? 7. What will the future geological explorations deal with?

Ex. 3 Paraphrase the following sentences.

1. *Only* in the seventeenth century scientists in the *west concentrated their attention* on the Moon. 2. The tectonic and geological *exploration* of the Moon goes *along with* the topographic *exploration* of both sides. 3. The first men on the Moon set up seismometers in order to discover *if* the Moon still has magnetic activity inside. 4. The future geological exploration of the Moon will be *devoted to* lunar matter. 5. The first analyses *made* by unmanned probes showed rocks of basalt-like composition.

Ex. 4 Guess the meaning of the italicized words.

1 a) the first *atlas* of the far side of the moon was *published* in Russia. b) As a result of *photographs* obtained by *series* of *Lunar-Orbiter* flights the visible side of the moon is recorded on maps. c) The main *interest* of the scientists is *concentrated* on *geological problems* of the moon. d) The first *seismograms* from the moon seem to *indicate* that the moon is still *active.*

2 a) The exploration and *mapping* of the Moon experienced a rapid development through the *unmanned* probes which photographed its surface. b) Power plants must be able to furnish a steady *dependable* current month after month. c) The question of whether *the* Moon has *workable* deposits may have immense economic significance.

3 a) The visible side of the Moon is recorded on maps of a *scale* of 1:1.000.000. b) The tectonic and geological *survey* of the Moon goes hand in hand with the topographic survey of both sides. c) The massive growth of the algae (водоросль) *depletes* the water of oxygen and thus kills off the fish life.

METEOROLOGICAL SATELLITES

The weather map remains one of the key tools (device) for the study of atmospheric processes and the prediction of the weather. Recently, two new devices which serve to increase our knowledge of the state of the atmosphere and our ability to carry out the forecasting process, have been introduced. They are the meteorological satellites and the high-speed electronic computers.

With the launching on April 1, 1960, of TIROS I, the first artificial satellite transmitting television pictures of cloud patterns back to the earth, a new era in meteorology began. Previously the pattern of clouds and storms was inferred (obtained) only from separate stations taking surface observations.

The clouds seen by the observers at these stations are only within a few tens of kilometers of the station. Since the stations are 200 km or more apart over the continents, even over these areas the synoptic weather map gives only a partial picture of the cloud cover.

The satellite pictures give an overview of areas about 1,000 km across or more at a time, and these pictures have shown patterns that had not been recognized or had been only partially appreciated previously. Some example of these are the banded structure of the clouds around large middle-latitude cyclones, the occurrence of eddies in the lee (sheltered side) of islands and the occurrence at times of large "hollow" cells of convective clouds over oceans.

Even more important than the fact that the satellites give an overall view and show the distribution of clouds in the area between stations in places

where there are no observing posts is the fact that they provide information for the large areas of the earth in which no stations exist.

For example, only a few land stations and weather ships together with ocean-going vessels and airplanes supply the data we have for weather conditions over the seven-tenths of the Earth covered by oceans. Large portions of the Earth are completely devoid of observations from within the atmosphere. For these areas the satellites provide the only information presently available.

Ex. 1 Give brief answers.

1. What is the main tool for the study of atmospheric processes and the prediction of weather? 2. What new devices for improving weather maps have been introduced? 3. When was the first meteorological satellite launched? 4. What area can be covered by satellite pictures? 5. What was the pattern of clouds inferred from previously? 6. What area can be covered by surface stations? 7. Are surface stations evenly distributed all over the world? 8. What other means for collecting weather information are in use?

Ex. 2 Answer in complete sentences.

1. When did a new era in meteorology begin? 2. What are the disadvantages of meteorological stations? 3. What are the advantages of satellite pictures? 4. What can satellite pictures show? 5. For which areas of the Earth is satellite information especially important?

Ex. 3 Paraphrase the following sentences.

I. The weather map is the main ***device*** for the study of atmospheric processes and the prediction of the weather. 2. Previously the pattern of clouds and storms was ***derived*** only from separate stations taking surface observations. 3. The observers of surface stations can see clouds only ***in the range*** of a few tens of kilometers. 4. Since ***the distance between*** meteorological **stations *is 200 km*** or more, the synoptic weather map gives only a partial picture of the cloud pattern.

Ex. 4 Guess the meaning of the italicized words.

1 a) A new *era* in *meteorology* began with the launching of the first *satellite.* b) The *satellite* provided *information* for the large areas of the earth in which no observation *posts* exist, c) State *reserves* of the Russian Federation play a leading *role* in the preservation of *biotic* plant and animal *associations* within natural ecosystems and the protection of the *genetic* diversity of species.

2 a) The satellite pictures give an *overview* of areas about 1,000 km at a time, b) *High-speed* electronic computers serve to increase our *knowledge* of the state of the atmosphere and our *ability to* carry out forecasting process, c) The mare (sea) of the moon are lowlands of immense extent covered by *predominantly* fine material.

3 a) The weather map is one of the main *tools* for the study of atmospheric processes and the prediction of the weather. b) Before the launching of the first artificial satellite, the pattern of clouds and storms was *inferred* only from separate stations.

NEW CANAL MAY LEAD TO FISH DYING OUT

Many ships are too large for the narrow passage of the present Atlantic-Pacific canal, built early in this century. Others carrying valuable cargoes are forced to delay passage for several costly days because of the traffic jam in the complex series of locks. It is believed that the saturation point of the present canal will be reached in a few years, lending urgency (making it necessary) to studies for a new canal.

Several canal sites for a new canal have been proposed, including some in little-populated areas. But those now most favoured are two within 50 miles of the present canal. The other sites are far lengthier, and economical only with cheap nuclear blasting.

Biologists believe that nuclear blasting will create too much dangerous radioactivity, as well as either risks to nearby population. They also agree that no one can say whether a sea-level canal even if dug (cut) by conventional explosives, is biologically safe. This is because it could mix Atlantic and Pacific fish and other life forms, with possible extinction of many species.

It is the economical consequences of the canal, no matter how it is dug, that worried the biologists. A National Academy of Sciences publication reported that environmental effects would be "far beyond" merely altering the sea environment and its life forms, and include effects on migratory species, on terrestrial fauna and flora, on microorganisms and on local urban and rural human population.

The biologists think that at least 10 to 15 years of intensive research are needed. For one thing, they advise annual counts of ocean population, like fish and shrimps, just to set a base line by which to judge (determine) a new canal long-range effects.

Ex. 1 Give brief answers.

1. What canal is discussed in this article? 2. When was it built? 3. Is it wide enough for modern ships? 4. When will the saturation point of this canal be reached? 5. Have sites for a new canal been proposed? 6. Where are the most favoured sites for a new canal located? 7. What are the disadvantages of other sites? 8. What explosives are used for digging canals? 9. Why are nuclear explosives dangerous? 10. Is a sea-level canal dug by conventional explosives biologically safe? 11. What may be the result of the mixing of Atlantic and Pacific waters? 12. How long will it take the biologists to judge a new canal long-range effects?

Ex. 2 Answer in complete sentences.

1. Why is the Panama Canal reaching its saturation point? 2. What sites for a new canal have been proposed? 3. What will be the environmental effects of a sea-level canal (no matter how it is dug)? 4. How much time will it take to determine a new canal long-range effects? 5. What do the biologist advice?

Ex. 3 Paraphrase the following.

1. A sea-level canal *whether* it is dug by nuclear blasting or by conventional explosives is biologically unsafe. 2. Biologists believe that nuclear blasting would create *both* dangerous radioactivity *and* other risks to nearby population. 3. The biologists believe that altering sea environment will affect both

migratory species *and* terrestrial fauna and flora. 4. The most favoured sites for a new canal are within 50 miles of the present canal. The others are *much* lengthier. 5. The biologists think that *no less than* 10 to 15 years of intensive research are needed to judge a new canal long-range effects.

Ex. 4 Guess the meaning of the italicized words.

1 a) *Biologists* believe that nuclear explosions will create too much dangerous *radioactivity* to nearby *population.* b) *National Academy* of Sciences *publications reported* that a sea-level *canal* would include *effects* on *migratery* species, on *terrestrial fauna* and *flora* and on *microorganisms.* c) Preservation of *representative* coastal *ecosystems* is extremely important because coasts are the interface between *oceanic* and terrestrial biomas, they have *unique flora* and *fauna* and they are among the most *dynamic physical* and *biological* environments.

2 a) Ships are sometimes *forced* to delay *passage* through the Panama Canal for several costly days. b) To estimate a new canal *long-range* effects, annual counts of oceanic population should be carried out. c) To make use of the potential power of streams characterized by great fluctuations in volume and flowing in broad valleys *necessitates* dams of such dimension that the resulting lakes cover large areas of *usable* land.

3 a) Nuclear *blasting* creates dangerous radioactivity and other risks to nearby population. b) Ships carrying *cargoes* of grain, cotton and petroleum cross the Atlantic all the time.

DEPOSITION OF GLACIERS

Glaciers deposit their load, like streams, when their kinetic energy becomes insufficient to transport the load. In most cases this is because melting exceeds the supply of fresh ice derived from the snow fields. However, deposition may also take place along with forward progression when the ice becomes overloaded with debris.

Several unique features may become noted concerning glacial deposition. First, the deposition is not related to the slope or elevation of the land surface. This is especially true of continental ice sheets where the ice mass may be a mile in thickness. Some of the depositional plains in central Illinois and Indi-

ana completely mask an underlying terrain having a local relief of 100 to 200 feet. In the rougher terrain to the east, in the northern Appalachians, the glacial debris is likely to be thicker in the valleys than on the uplands. Second, glacial deposits that result from material dropped from suspension in ice are unassorted and unstratified. Large glacial boulders may be mixed amid (among) extremely fine clays or coarse sand.

This material termed glacial till, is likely to have a wide textural range. Third, most deposits, even those associated with continental ice sheets, show a close correlation in composition and texture to that of the underlying rock. Owing to the lobate feature of continental ice sheets, in which the outer edge is in a series of lobes or loops, especially in rough terrain, portions of the ice may become broken away from the main mass during the retreat of the ice front and stagnate. A large portion of the depositional material in this case will be water-worked and sorted as to size. Lastly, glacial deposition always involves extensive supplemental transportation and deposition by running water. Regardless of their location, glaciers always have a melting outer edge, and glacial melt-water is an important adjunct to (part of) glacial deposition.

Unless stagnated, a condition that is localized, an ice front appears to retreat because the rate of melting exceeds its forward progression. The ice continues to move forward during the melting process, although the front of the ice may be stationary, retreat or press forward, depending on the ratio between melting and ice movement. When an ice margin remains constant for a long time, indicating a close balance between melting and movement, a large amount of material may accumulate at the ice margin, forming thick deposits of glacial till termed moraines.

Ex. 1 Give brief answers.

1. When do glaciers deposit their load? 2. May deposition take place along with forward movement? 3. Is deposition related to the slope or elevation of the land surface? 4. What type of material is deposited by glaciers? 5. What is this material termed? 6. What is the composition and texture of till deposits related to? 7. What is an important adjunct (part) to glacial deposition? 8. What do we call thick accumulations of glacial till at the ice margin? 9. When do moraines form?

Ex. 2 Answer in complete sentences.

1. Why does kinetic energy of glaciers become insufficient to transport the load? 2. When may deposition take place along with forward progression? 3. What is the evidence of the fact that glacial deposition is not related to the slope or elevation of the land surface? 4. What do we call till? 5. Why may portions of ice break away from the main mass during the retreat? 6. What happens with the depositional material in this case? 7. Why does an ice front appear to retreat? 8. What does a persistently constant ice margin indicate? 10. What do we call moraines and when are they formed?

Ex. 3 Paraphrase the following sentences.

1. Glacial deposition may take place *side by side* with forward progression when the ice become overloaded with debris. 2. A large portion of the depositional material may be water-worked, and sorted *as regards* size. 3. *No matter how they are located,* glaciers always have a melting outer edge. 4. *Due to* the lobate feature of continental ice sheets, portions of the ice may become broken away from the main mass during the retreat of the ice front and stagnate.

Ex. 4 Guess the meaning of the italicized words.

l a) Several *unique* features may be noted concerning *glacial* deposition. b) Some of the depositions plains completely *mask* an underlying *terrain.* c) The *material termed glacial till* may have a wide *textural* range. d) The ice continues to move *forward* during the melting *process* although the *front* of the ice may be *stationary,* retreat or slowly *press forward.*

2 a) Glaciers deposit their load when their kinetic energy becomes *insufficient* to transport the load. b) When glaciers become *overloaded* with Debris, deposition may take place. c) Most glacial deposits show a close *correlation* in composition and texture to that of the *underlying* rock.

3 a) Large glacial boulders mixed with extremely fine clays or coarse sand are termed glacial *till.* b) Since the outer edge of continental ice sheets forms a series of lobes, especially in rough terrain, portions of the ice may break away from the main mass during the retreat of the ice front and stagnate.

SALINITY VARIATION FROM PLACE TO PLACE

The salinity of the sea is lowest wherever there is much rainfall or where many rivers empty into the sea. In the places receiving a great deal of fresh water in this way, the salinity of the sea may be less than 34%. In the vicinity of Newfoundland, for instance, the salt content is less than 34% due to not only fresh water discharge by the St. Lawrence River and the rivers of Labrador, but also to the pack-ice and icebergs floating down from the north. Here they give off their melt-water, which contains far less salt than does oceanic water; in the case of icebergs, the melt-water contains no salt.

The salinity of the Baltic Sea is very low, less than 10% in most places. This is because many rivers and rivulets discharge into it while salt oceanic water enters only slowly through the strait connecting the Baltic Sea with the Atlantic Ocean. The surface salinity of the Arctic Ocean is likewise comparatively low, especially opposite the coast of Northern Siberia, where the great Siberian rivers discharge; but as this water remains on the surface (fresh water being lighter than salt water), the salinity at greater depths in the Arctic Ocean is nevertheless normal.

The salinity of the ocean is high wherever strong evaporation is continually extracting water from the sea, with the result that the water left behind holds a higher proportion of salt. This is especially true of subtropical regions, where the barometer reading is mostly high, and consequently there is much sunshine and little rainfall. In the Sargasso Sea, for instance, in the middle of the Atlantic Ocean at about 25°N, the salinity is more than 37%. The high salinity of the Gulf Stream, too, is due in part to the fact that some of its water comes from the Sargasso Sea. Salinity is higher still in the Mediterranean and Red Seas, being above 38% in the former and as much as 41% in the northern part of the latter. This is because these seas do not receive fresh water either from rivers or from rain, while at the same time they are exposed to severe evaporation owing to their position; furthermore, being almost enclosed, they have scanty communication with the open ocean.

Ex. 1 Give brief answers.

1. What is the salinity of the sea where many rivers empty into it? 2. Does rainfall affect the salinity of the sea? 3. Does the melt water of icebergs con-

tain salt? 4. What is the salinity of the Baltic Sea? 5. Do many rivers discharge into it? 6. Does the oceanic water penetrate into it? 7. Is the salinity of a sea uniform throughout its depth? 8.Why may the surface salinity of a sea be lower than its salinity at greater depths? 9. In what region of the world is the salinity of an ocean high? 10. What seas are noted for their high salinity?

Ex. 2 Answer in complete sentences.

1. In what places is the salinity of the sea lowest? 2. Why is the salinity of the sea in the vicinity of Newfoundland low? 3. Why is the salinity of the Baltic Sea low? 4. What is the salinity of the Arctic Ocean? 5. Where is the salinity of the ocean high? 6. Why is the salinity of seas in subtropical regions especially high? 7. What is the salinity of the Sargasso Sea? 8. What factor is responsible for the high salinity of the Gulf Stream? 9. Why is the salinity of the Mediterranean and the Red Seas so high?

Ex. 3 Paraphrase the following sentences.

1. In the places receiving *plenty of* fresh water the salinity of the sea may be less than 34%. 2. The salinity of the Baltic Sea is low. The surface salinity of the Arctic Ocean is *also* low. 3. The Mediterranean Sea receives fresh water *neither* from the rivers nor from rain. 4. The salt content of the sea in the vicinity of Newfoundland is low *owing to* water discharge by St. Lawrence River and the rivers of Labrador.

Ex. 4 Guess the meaning of the following words.

1 a) In the vicinity of Newfoundland the salt content of the sea is less than 34% due to not only fresh water discharge by the rivers but also to the *pack* ice and *icebergs* floating from the north. b) A *group* of *geologists bulldozing* along the sides of the stream discovered the body of a *baby mammoth*.

2 a) Being almost *enclosed*, the Red Sea has *scanty* communication with the open ocean. b) Deep gorges greatly influence the factor of *accessibility* and constitute the primary terrain obstacle to surface transportation routes. c) Many rivers *discharge* into the Baltic Sea. d) Coastal plains *necessarily* include all plains that lie along the coast. c) The tundra is a vast *treeless* expanse of land.

3 a) *Due* is condensed water vapour that has collected on ground surface. b) Transportation is the *exhalation* of water vapour by plants.

MOUND SPRINGS

The upward movement of artesian water under considerable pressure may result in the transportation of weathered clays and dissolved materials in flowing mud. Subsequent deposition of this material may then occur at the surf ace in the form of mounds resembling small volcanoes.

These features are referred to as mound springs. Within the Great Artesian Basin in Australia leakage is afforded by springs which occur both in low water pressure areas and also in the high pressure areas of the main portion of the basin.

Mound springs frequently occur in rows or belts along zones of active tectonism as, for example, along the western margin of the Lake Eyre Basin. They have also been observed where cover sediments above an aquifer are particularly thin as along the Eulo Ridge of south-western Queensland

In South Australia both active and inactive examples have been studied. Inactive examples in that area presently stand up to 47 m above the surrounding plains, but, as a result of erosion, rest on pedestals of slightly weathered bedrock up to 11 m above the modern lower surface. Nearby, recent active mound springs up to 6m high are exposed directly on the lowered erosional surface.

Active mound springs tend to be circular in form and frequently reveal collapsed (caved in) summits. The associated spring either forms a small pool in the top of the mound or issues from the side. These mounds consist of a mixture of cretaceous materials as well as pieces of indurated (hardened) calcareous sediments and may reveal a laminated (layered) structure parallel to the surface of the mound resulting from successive deposition of calcium carbonate and minor salts.

The deposition is, at least in part, due to loss of gases such as CO_2 and SO_2 on pressure release at the surface, reducing the capacity of the water to retain these salts in solution. In any given field, these features tend to reach an optimum height which appears to be governed primarily by the hydrostatic pressure of the artesian water involved in their production.

Ex. 1 Give brief answers.

1. What material can artesian water transport in its upward movement? 2. Do mound springs occur only in the high water pressure areas? 3. In what geologic zones do mound springs occur? 4. What type of mound springs are found in South Australia? 5. What is the shape of an active mound spring? 6. What material do these mounds consist of?

Ex. 2 Answer in complete sentences.

1. What may the upward movement of artesian water result in? 2. What does the subsequent deposition of this material result in? 3. What do such springs afford? 4. Where do such springs occur? 5. What height do active and inactive springs attain? 6. What is the difference in their structure? 7. Why do inactive examples rest on pedestals? 8. What shape do active mound springs tend to acquire? 10. What is the composition of active mound springs? 11. What is the structure of a mound spring? 12. Why do mound springs have a laminated structure? 13. What factor is Responsible for the deposition of calcium carbonate and salts? 14. What is the optimum height of a mound spring governed by?

Ex. 3 Paraphrase the following sentences:

1. Mound springs *are aligned along* zones of active tectonism. 2. Leakage is *supplied* by springs which occur in low water pressure areas *as well as* in the high pressure areas. 3. The height of a mound spring is determined by the hydrostatic pressure of the artesian *water associated with* their production. 4. The total energy *necessary* to global precipitation is enormous.

Ex. 4 Guess the meaning of the italicized words.

1 a) Mud springs frequently occur along the *zones* of *active tectonism.* b) Mounds *tend* to reach an *optimum* height which is governed by the *hydrostatic* pressure of the *artesian* water.

2 a) A rapid increase in the number of cattle caused heavy grazing pressure on the *seemingly endless* expanses of grassland. b) Recent active mounds are exposed *directly* on the *lowered* erosional surfaces. c) The density of meteor-

ological network in the world is *uneven*. d) If tornado reaches the ground, *unbelievable* destruction is suffered by anything in its path. e) The most striking fact about the distribution of man over the earth is its great *unevenness*.

3 a) The land masses of the earth, *pushed* continuously by the oceans and *tugged* by the sun and moon, rise and fall an average 12 inches a day. b) *Conduction* is the process of transmitting sensible heat within a substance or between materials by contact.

WHAT IS THE EARTH MADE OF?

A sort of rough answer to this question would be: The earth is a big ball, or sphere, made mostly of rock. Inside the earth the rock is melted, but the outside cover is hard rock. Less than one-third of the earth's surface is land and more than two-thirds are water.

Now let's consider this in a little more detail. Outside of the earth is a crust of rock about 10 to 30 miles thick. This crust is sometimes called "the lithosphere". The high parts of this crust are the continents, and the low parts of it hold the waters of the oceans and the great inland seas and lakes. All the water on the surface, including the oceans, lakes, rivers, and all the smaller streams, is called "the hydrosphere".

Men have been able to examine only the outermost part of the crust of rock that forms the outside of the earth, which is why it's so hard to know what the earth is like on the inside. In drilling wells and digging mines, it has been found that the deeper the hole is made, the higher the temperature becomes. At two miles below the surface of the earth. The temperature is high enough to boil water.

But scientists have also been able to find out about the inside of the earth from studies of earthquakes. They believe that the temperature does not increase as rapidly deep down as it does in the crust. So they think that at the core or center of the earth the temperature may not be more than 10,000 degrees Fahrenheit. Of course, that's plenty hot – since a temperature of 2,200 degrees would melt rocks!

The crust of the earth has two layers. The upper layer, which makes the continents, is of granite. Under the layer of granite is a thick layer of very hard rock called "basalt". Scientists believe that at the center of the earth is a huge ball of molten iron, with a diameter of about 4,000 miles. Between the

central ball and the rocky crust is a shell about 2,000 miles thick called “the mantle”. The mantle is probably made of a kind of rock called “olivine”.

Ex. 1 Think and answer.

1 What is the form of the Earth?
2 What is the crust?
3 What is the lithosphere?
4 What is the hydrosphere?
5 How does the temperature change with depth?
6 What kind of information can be obtained from studies of earthquakes?
7 What is the composition of the earth’s crust?
8 What is “basalt”?
9 What is the mantle?
10 What is “olivine”?

WHAT IS OXYGEN?

Every now and then you read about something that man “couldn’t live without”. Well, one thing you can be sure is absolutely necessary to life is oxygen. Without oxygen, a human being cannot live more than a few minutes.

Oxygen is an element, the most plentiful element in the universe. It makes up nearly half of the earth’s crust and more than one-fifth of the air. Breathed into the lungs, it is carried by the red blood corpuscles in a constant stream to the body cells. There it burns the flood, making the heat needed to keep the human engine going.

Oxygen combines very easily with most elements. When this takes place, we call the process “oxidation”. When this oxidation takes place very quickly, we have “combustion”. In almost all oxidations, heat is given off. In combustion, the heat is given off so fast that it has no time to be carried away, the temperature rises extremely high, and a flame appears.

So at one end we have combustion, the fast oxidation that produces fire and at the other end we have the kind of oxidation that burns the food in our body and keeps the life process going. But slow oxidations, by the oxygen of the

air, are found everywhere. When iron rusts, paint dries, alcohol is changed into vinegar, oxidation is going on.

The air we breathe is a mixture chiefly of nitrogen and oxygen. So we can prepare pure oxygen from the air. It is done by cooling the air to very low temperatures until it becomes liquid. This temperature is more than 300 degrees below zero Fahrenheit. As soon as the liquid air warms up a little above that temperature, it boils. The nitrogen boils off first and oxygen remains. Many a life has been saved by giving people oxygen to make breathing easier when their lungs were weak.

Ex. 1 Think and answer.

1 How abundant is oxygen in the universe?
2 Where is oxygen distributed?
3 What is the role of oxygen in human life?
4 What is “oxidation”?
5 What is “combustion”?
6 What is the difference between combustion and oxidation?
7 What is the composition of air?
8 How can pure oxygen be prepared from the air?
9 When does liquid air start boiling?
10 What happens with nitrogen as soon as liquid air warms up?

WHAT IS SAND?

Sand is really a collection of tiny rocks. Sand is the result of the breakup of the solid rock surfaces of the earth during a period of millions of years. Some rock fragments undergo a chemical action or become dissolved into a fine powdery mass that becomes soil. The fragments that are too hard or could resist the chemical action remain gritty particles that we call sand. Each particle may be from a tenth to a hundredth of an inch in diameter.

In the breakup of ancient rocks, pieces of gravel would be picked up by floods and rivers and they would be rolled along down into the valleys and river beds. As they rolled, many of the gravel pebbles were cracked and gradually they became worn down into grains of sands.

If you look at sand under a magnifying glass, you will notice that there can be quite a collection of different particles. Those that are smooth and well-rounded have either traveled a long distance or have been churned around by the surf on the shore of an ocean. The particles with sharper edges have splintered off more recently and have not traveled very far.

Usually, each grain of sand is composed of only one mineral. But if you pick up a handful of sand, there may be a variety of minerals in it. The most common mineral in sand is quartz.

If there are iron compounds in the sand, it may have interesting colors. Some sands contain rare minerals such as gold, zircon, and garnet. The "white sands" of New Mexico are nearly pure gypsum.

Some sand is so firm and hard-packed that it can be used as a track for auto racing. This firmness is caused by the presence of just enough water to fill the spaces between the grains.

Ex. 1 Think and answer.

1 Why can sand be called "a collection of tiny rocks"?
2 How is sand formed?
3 What are the main characteristics of sand particles?
4 How do the gravel pebbles change into sand grains?
5 What can the form of a particle tell us about its history?
6 What is the mineralogical composition of sand?
7 Why do sands have different colors?
8 What are "white sands"?
9 Where is firm sand used?
10 Why are some sands so hard packed?

WHAT IS SALT?

Salt is one of the most common minerals. Chemically, salt (or sodium chloride), is a compound of sodium and chlorine. The common salt we use at home is produced in various ways: from sea water, or the water of salt lakes, from salt springs, and from deposits of rock salt.

A gallon of ordinary sea water contains about a quarter of a pound of salt. Some salt lakes, such as the Dead Sea or Great Salt Lake, contain even larger percentages of salt.

Beds of rock salt are found in various parts of the world and are sometimes hundreds of feet thick. They were probably formed by the evaporation of ancient seas, whose bottoms were later covered by layers of mud and sand. Salt springs may have been formed by the filtering of water through these beds of rock salt.

Most commercial salt is made from rock salt. Wells are drilled down to the salt beds. Pure water is pumped down to the rock salt through a pipe. The water dissolves the salt. The brine, or salt water, is forced up to the surface through another pipe.

After the salt has been brought up in the form of brine, it is evaporated by steam in open pans or in vacuum pans until it forms grains. These grains are dried and then graded. Table salt has a very fine grain. Salt today has many uses in industry, such as in the manufacture of glass, soap, and leather.

Ex. 1 Think and answer.

1 How abundant is salt?
2 What is its chemical composition?
3 What are the main sources of the common salt?
4 What is the common salt?
5 What is the origin of rock salt?
6 What is the origin of salt springs?
7 How is commercial salt obtained?
8 What is the brine?
9 How is table salt made?
10 Where is salt used?

HOW DO RIVERS FORM?

Rain and other water on the earth’s surface is constantly being carried off. Rivers are the larger streams that accomplish this task. Streams smaller than

rivers are brooks. And still smaller streams are rivulets. These flow together and join until the growing stream may become a large river.

Many rivers flow into the sea. But some rivers flow into inland lakes, and rivers that enter dry plains may even grow smaller and smaller until they disappear by evaporation or by sinking into the dry soil.

River water comes in part from rain water that flows along the ground into the stream channel. Or the river water may come from melting snow and ice, from springs, and from lakes.

Large rivers have many tributaries, or smaller streams, that flow into the main stream. The Ohio and Missouri – which are giant rivers themselves – are really tributaries of the still greater Mississippi. Each tributary has its own smaller tributaries, so that a great river system like the Mississippi is composed of thousands of rivers, creeks, brooks, and rivulets.

The land drained by a river system is called its “drainage basin”, or “watershed”. The Missouri-Mississippi, which is about 3,890 miles long, drains about 1,243,700 square miles. The Amazon River, some 3,900 miles long, has a watershed of over 2,722,000 square miles!

Rivers wear away the land and carry it, bit by bit, into the sea. During thousands of years, this can cause great erosion in the land. The Great Canyon and the Delaware Gap show how rivers can cut great valleys into the land.

Ex. 1 Think and answer.

1 What is a river?
2 What is a brook?
3 What is a rivulet?
4 Do all rivers flow into the sea?
5 What is the origin of river waters?
6 How does a river system look like?
7 What are tributaries?
8 What is “watershed”?
9 How do rivers affect the land?
10 How are valleys formed?

WHAT IS COPPER?

Man discovered copper before any other metal except gold. Before the dawn of history, it was used by Stone Age men.

Copper is found in a fairly pure stat, in lumps and grains of free metal. Probably men first picked up the lumps because they were pretty. Then they made the great discovery that these strange red stones could be beaten into any shape. This was an easier method of making weapons and knives than chipping away at flints.

Much later, other men discovered that they could melt the red stones and form the softened mass into cups and bowls. Then they started to mine for copper and to make all sorts of implements and utensils out of it.

For thousands of years, copper remained the only workable metal known, for gold was not only too scarce to be considered but also too soft to be practical. Copper tools were probably used in building the great Egyptian pyramids.

Few people ever see pure copper or would recognize it if they did. It is a shining, silvery substance delicately tinted with pink that turns a deeper red when exposed to the air. The copper we generally see has a dull reddish-brown surface. This is an oxide formed when the metal combines with the oxygen of the air.

Most of the world's copper exists in combination with other substances from which it must be separated before it can be used. Often it is found combined with sulphur in what we call a sulphide ore. This sulphide ore may be combined with such substances as iron and arsenic and this makes the separation of the copper difficult.

Copper has many other virtues besides that of outlasting most other metals. It is tough, yet soft enough to be pulled and pounded and twisted into any shape. It is an excellent conductor of heat as well as of electricity. It can be carved or etched, but is not easily broken. And it can be combined with other metals to make such alloys as bronze and brass.

Ex. 1 Think and answer.

1 What metal: gold or copper, was discovered earlier?
2 In what form is copper discovered?

3 Why was copper used widely in making weapons?
4 Why is copper used for making implements and utensils?
5 Why was copper considered the only workable metal known?
6 How and why does color of copper change when it is exposed to air?
7 Is it difficult to recognize pure copper? Why?
8 In what combinations does copper exist?
9 What are the main advantages of copper in comparison with other metals?
10 What is bronze/brass?

HOW DOES AN EARTHQUAKE START?

You can get a pretty good idea of what causes an earthquake from thinking about what happens during an earthquake. During an earthquake, there is a trembling of the ground. It is this trembling of the earth which may cause buildings to fall.

So an earthquake is a trembling or vibration of the earth's surface. What makes it happen? Well, the rock of the earth's crust may have a "fault", a kind of break in the crust. The earth blocks shift. Sometimes the sides of the fault move up and down against each other. At other times, the sides of the fault shift lengthwise.

But when one rock mass has rubbed on another with great force and friction, we have a lot of energy being used. This vast energy that comes from the rubbing is changed to vibration in the rocks. The vibration may travel thousands of miles.

The reason earthquakes take place in certain regions frequently and almost never in other regions, is that the faults in the earth's crust are located in these regions.

Ex.1 Think and answer.

1 What happens during an earthquake?
2 What causes building to fall?
3 What is an earthquake?
4 What causes the vibration of the surface?

5 What is a fault?

6 What happen with the earth's blocks?

7 How do the sides of the fault move?

8 What are the reasons of the uneven distribution of the earthquakes on the earth?

HOW DOES A VOLCANO FORM?

In February, 1943, in the middle of a cornfield in Mexico, people saw a rare and amazing thing taking place. A volcano was being born! In three months it had formed a cone about 1,000 feet high. Two towns were destroyed and a wide area damaged by the falling ash and cinders.

What makes a volcano form? The temperature under the surface of the earth becomes higher and higher the deeper you go down. At a depth of about 20 miles, it is hot enough to melt most rocks.

When rock melts, it expands and needs more space. In certain areas of the world, mountains are being uplifted. The pressure becomes less under these rising mountain ranges, and a reservoir of melted rock (called "magma") may form under them.

This material rises along cracks formed by the uplift. When the pressure in the reservoir is great than the roof of rock over it, it bursts forth as a volcano.

In the eruption, hot gaseous, liquid, or solid material is blown out. The material piles up around the opening, and a cone-shaped mound is formed. The "crater" is the depression at the top of the cone where the opening reaches the surface. The cone is the result of a volcano.

The material coming out of a volcano is mainly gaseous, but large quantities of "lava" and solid particles that look like cinders and ash are also thrown out.

Actually, lava is magma that has been thrown up by the volcano. When the magma comes near the surface, the temperature and the pressure drop, and a physical and chemical change takes place that changes the magma to lava.

Ex.1 Think and answer.

1 What could be observed in a cornfield in Mexico in 1943?

2 What happened with a surrounding area?

3 How does the temperature change with the depth?

4 What causes the formation of a reservoir of melted rock under the rising mountain?

5 What is magma?

6 What is the route of the molten material?

7 What are the main products of the eruption?

8 What is called “a cone” of a volcano?

9 What is a crater?

10 What is lava?

WHAT IS NICKEL?

Nickel forms many alloys which are used in hundreds of industries in many ways. It is one of the most useful metals known to man. But in early times, when chemists first tried to work with it, it gave them a great deal of trouble. In fact, the word “nickel” is derived from the German word for “imp”!

Nickel is found in meteorites, and it is sometimes found in the free state in small quantities. But the greatest supply of nickel is obtained from certain ores, especially one called pyrrhotite, which is a mineral containing iron, copper, and nickel. Canada is the greatest of all nickel-producing countries.

The ore containing nickel is usually heated in a blast furnace to obtain a rich mixture. This is then reduced to nickel by mixing it with coke and heating it in a blast furnace.

Nickel is silvery, lustrous, hard, and malleable, which means it can be easily worked and shaped. And nickel is one of the most magnetic materials known, unless heated.

We seldom see pure nickel except when it is used as a coating on other metals. This is then called nickel-plate. It protects other metals from rust or tarnish, and gives them a better wearing surface.

Most of nickel produced is used in alloys, or in a mixture with other metals. For instance, when alloyed with copper, it is used in coins. Our own five-cent piece is called a nickel for that reason. When it is alloyed with three parts of copper and one of zinc, nickel forms a bright silvery metal known as German silver or nickel silver.

This is used for making tableware and as a base for silverplated ware. But these uses of nickel are relatively minor. Most nickel goes into the making of nickel steel, an alloy which can withstand repeated strains. It is used in structural work, bridges, railroad rails at curves, rivets, locomotive boilers, automobile gears and axles.

Ex.1 Think and answer.

1 Why was nickel considered troublesome?
2 What is the origin of the word “nickel”?
3 Where can nickel be found?
4 What country is the greatest producer of nickel?
5 How is nickel produced?
6 What are the main properties of nickel?
7 What is called “nickel plate”?
8 Where are nickel alloys used?
9 What is the main quality of nickel steel?
10 Where is nickel steel used?

WHAT IS MARBLE?

Nature is a master baker. Deep inside the earth is her oven, heated thousands of years ago by great rising masses of molten rock. In this oven she baked, and with tremendous pressure turned limestone into hard marble.

In its purest form, marble is white. Different impurities often give it shades of pink, red, yellow, or brown, or form wavy lines or patches in it. Different colored crystals caught in the marble sparkle and flash in the sun’s rays. In some marble the remains of fossils add to its beauty.

Many other kinds of rock that take on a high polish and are used in building, such as granite, onyx, and porphyry, are often called marble. Real marble, however, is limestone that has been crystallized by nature’s process.

When marble is quarried a machine called a “channeler” cuts a series of channels or slots in the face of the rock. Some of these slots may be 8 to 12 feet deep and run from 60 to 80 feet in length. Blasting cannot be used be-

cause it would damage or shatter the marble. The blocks are lifted out carefully by large derricks.

A great toothless saw is set to work on the rough stone, while a stream of water containing sand is kept running over it. The friction of the steel blade and the sand soon cuts the marble into the desired sizes. Sometimes a wire saw is used instead of a solid blade.

Pieces of marble are then placed on a circular rubbing bed and held stationary. Sand and water flow over the rotating bed surface, rubbing away the marble to an even level. Then still more grinding is done to give it a smooth surface.

The last fine polishing is done by a mixture of tin oxide and oxalic acid applied to the surface of the marble by means of a buffer wheel.

Ex.1 Think and answer.

1 Why can nature be called a “master baker”?
2 How does limestone differ from marble?
3 Why is a machine used for marble quarrying called “a channeler”?
4 Can blasting be used when marble is quarried? Why?
5 How are blocks of marble produced?
6 What are the main industrial processes used in the marble producing?
7 Where is marble used?

WHAT IS SILVER?

The mining of silver has been carried on from ancient times. In Europe, kings depended on it as their source of wealth. In fact, when the Spanish silver mines began to run low, the King of Spain was delighted that the discovery of America led him to obtain the great silver mines of Mexico and Peru. The mines at Potosi in Peru produced $4,000,000 worth of silver every year for 250 years for the kings of Spain!

During the gold rush days in California, people cursed the “black earth” that struck to their gold dust. It was only by accident that they discovered it was silver ore!

Silver is one of the most widely distributed of all metals. Sometimes it is found in solid pieces. About 2,000,000 tons of it float about in solution in the sea, but it would not pay to get it out. In the main, silver comes only in ores from which it must be separated. In this ore, silver is usually combined with sulphur as silver sulphide, or is a part of other sulphides, chiefly those of copper, lead, or arsenic. In the United States, it is found mostly in connection with lead. In fact, silver occurs in so many combinations that there are a great many different methods of separating it from the other elements.

Silver is too soft to be used in its pure state, so it is combined with other metals. Silver coins, for instance, contain 90 per cent silver and 10 per cent copper. The sterling silver of which jewelry and silverware are made contains 92.5 per cent silver and 7.5 per cent copper. The name “sterling”, by the way, has a curious origin. It comes from a North German family called Easterling. The Easterlings were such honest traders that King John of England gave them the job of making the English coins in 1215. They did it so well and truly that their name is still used as a sign of solid worth. All sterling silver is stamped with a hallmark, either the word “sterling” or a symbol, depending on the country. The English symbol is a lion. Pure silver doesn’t tarnish in pure air. When it turns black, that’s a sign there is sulphur in the air, as from city smoke or oil wells. Next to gold, silver is the easiest metal to work with. One ounce of silver can be drawn into a wire more than 30 miles long! It is also the most perfect known conductor of electricity and heat.

Ex.1 Think and answer.

1 How old is the process of the silver mining?
2 Why did Kings in Europe depend on silver?
3 What were “gold rush days”?
4 What is “the black earth”?
5 Why did people curse it?
6 How and where is silver distributed?
7 What is it difficult to use silver in its pure state?
8 What is “the sterling silver”?
9 What is the origin of the name “sterling”?
10 What are the most important physical properties of silver?

WHAT IS A DIAMOND?

If you had a piece of putty and wanted to make it hard, what would you do? You'd squeeze it and press it, and the more you squeezed and pressed, the harder it would become.

Diamonds were made in the same way by nature. A hundred million years ago, the earth was in its early cooling stages. At that time, there existed beneath the ground a mass of hot liquid rock. This was subjected to extreme heat and pressure. Carbon which was subjected to this pressure became what we called "diamonds".

The word "diamond" comes from the Greek word *adamas*, which means "unconquerable". A diamond is truly unconquerable, for nothing in the world can cut it – except another diamond!

The first records we have of people deliberately looking for diamond indicate that this happened in India. Diamond mining as an industry started there more than 2,500 years ago!

Diamonds were prized from the very beginning. In fact, before the fifteenth century, diamonds were still so rare that only kings and queens owned them.

Today, the capital of the diamond empire is j South Africa where, in 1867, important sources of diamonds were discovered by accident. A poor farmer's child found a pretty stone. A shrewd neighbor who recognized it as a gem diamond bought it, and when he sold it, diggers of all ages and nationalities flocked to the scene.

Within a year, three great diamond fields were found and the city of Kimberly, the center of a great diamond empire, was born.

The only difference between an industrial diamond and any other kind of diamond is that the industrial diamond is of an inferior grade. If it were of perfect quality, beautiful in color and without a flaw, the diamond would, of course, be used in jewelry, where it brings higher prices.

It may seem astonishing to you that something as precious as a diamond is used in industry at all, but the diamond has been called the "emperor of industry"!

So three fourths of all diamonds that are found don't go into jewelry at all. They are used in industry. And they are used because of their extreme hardness. For instance, about 20 per cent of all industrial diamonds are mounted in drills and used by mining companies to drill through rock.

Diamonds are crushed to dust and this diamond dust is used in making diamond-grinding wheels. These wheels sharpen certain tools and also grind lenses. Other diamonds are used in dies. Without diamonds, some of our most important industries would have to shut down.

Ex.1 Think and answer.

1 How does putty material change of pressed and squeezed?
2 How did the Earth look like a hundred million years ago?
3 Where did the word “diamond” come from?
4 How hard are the diamonds?
5 Where did the diamond mining industry start?
6 What is City of Kimberly famous for?
7 What does the price of a diamond depend on?
8 What is the difference between an industrial and any other kind of diamonds?
9 Why is the diamond called “the emperor of industry”?
10 What are diamond-grinding wheels used for?

WHAT IS PLATINUM?

Platinum is a metal – but what an amazing metal it is! It is grayish white in color, and its name comes from the Spanish *plata* and means “little silver”.

Platinum is harder than copper and almost as pliable as gold. You could take a single ounce of platinum and stretch it out into a fine wire that would reach from New York City to New Orleans, Louisiana. A cube of platinum measuring a foot each way would have a weight of more than half a ton! Platinum is almost twice as heavy as lead.

Platinum is usually found in ores often mixed with the rare metals palladium, rhodium, iridium, and osmium, which are called “platinum metals”. Occasionally, it is found with metals such as gold, copper, silver, iron, chromium, and nickel. It is found in the form of small grains, scales, or nuggets.

Large deposits of platinum were first discovered in South America in the eighteenth century. For a great many years it was considered quite useless, and so it was cheap. Then, when people began to find how useful this metal

could be, and since it is quite rare, the price went up to the point where that cube of platinum mentioned above would have been worth $2,500,000.

What makes platinum especially useful is that it resists oxidation, acids, and heat. The melting point of platinum is about 3,190 degrees Fahrenheit! For most purposes, platinum is mixed (alloyed) with one of the other “platinum metals” or with silver, gold, copper, nickel, or tin.

While the chief use of platinum is for opened or closed, in laboratory weights, in instruments for exact measurement of temperatures, and for fuses in delicate electric instruments.

Ex.1 Think and answer.

1 What is the word "platinum" derived from?
2 What color is platinum?
3 How hard is platinum?
4 How heavy is platinum?

WHAT IS WATER?

When scientists wonder whether there is life on other planets, they often ask this question: “Is there water there?” Life as we know it would be impossible without water.

Water is a tasteless, odorless, colorless compound that makes up a large proportion of all living things. It occurs everywhere in the soil, and exists in varying amounts in the air.

Living things can digest and absorb foods only when these foods are dissolved in water. Living tissue consists chiefly of water. What is water made of? It is a simple compound of two gases: hydrogen, a very light gas; and oxygen, a heavier, active gas.

When hydrogen is burned in oxygen, water is formed. But water does not resemble either of the elements which compose it. It has a set of properties all its own.

Water, like most other matter, exists in three states: a liquid state, which is the common form; a solid, called “ice”; and a gas, called “water vapor”. In

which one of these forms water shall exist depends ordinarily on the temperature.

At 0 degrees centigrade, or 32 degrees Fahrenheit, water changes from the liquid to the solid state, or freezes. At 100 degrees centigrade, or 212 degrees Fahrenheit, it changes from the liquid to the gaseous state. This change from liquid, visible water to the invisible water gas is called “evaporation”.

Thus, if a piece of ice is brought into a warm room, it starts to become liquid or melt. If the room is warm enough, the little puddle of water formed from the melting ice finally disappears. The liquid is changed into water vapor. When water is cooled, it expands just before it reaches the freezing point.

Water as it occurs in nature is never pure in the true sense. It contains dissolved mineral material, dissolved gases, and living organisms.

Ex. 1 Think and answer.

1 Is life on Earth possible without water? Why?
2 What are the main characteristics of water?
3 Where does water occur?
4 What is the composition of water?
5 What is hydrogen?
6 What is oxygen?
7 How does water change with temperature?
8 What is the process of “freezing” of water?
9 What is “evaporation”?

WHAT IS QUICKSAND?

People have been terrified of quicksand for centuries. It is supposed to have the mysterious power of sucking victims into it until they disappear.

The truth is, quicksand has no such power. And the fact is that if you know what it is and how to deal with it, it cannot hurt you at all.

What is quicksand? It is a light, loose sand which is mixed with water. It does not look different from sands which might be right next to it. But there is a difference: quicksand will not support heavy objects.

Quicksand usually occurs near the mouths of large rivers and on flat shores where there is a layer of stiff clay under it. Water is collected in the sand because the underlying clay keeps the water from draining away. This water may come from many different places, such as river currents or pools.

The grains of quicksand are different from ordinary grains of sand because they are round instead of being angular or sharp. The water gets between the grains and separates and lifts them, so that they tend to flow over one another. This makes them unable to support solid objects.

Some quicksand is not even made of sand. It can be any kind of loose soil, a mixture of sand and mud, or kind of pebbly mud.

People who step into quicksand do not sink out of sight. Since it contains so much liquid, it will enable them to float. And since quicksand is heavier than water, people can float higher in it than they do in water.

The important thing is to move slowly in quicksand. This is to give it time to flow around the body. Once it does this, it will act like water in which you are swimming.

Ex.1 Think and answer.

1 Why were people terrified of quicksand?
2 What are the main properties of quicksand?
3 What is the difference between sand and quicksand?
4 Why does quicksand contain water?
5 How does the form of grains of quicksand differ from that of sand?
6 Why is quicksand unable to support solid objects?
7 Does quicksand always contain sand?
8 Is it dangerous for people to step into quicksand? Why?
9 What is the main rule of behavior in quicksand?
10 Why is it important to move slowly in quicksand?

WHAT IS CHALK?

Practically no one can grow up in the world today without coming into contact with chalk at some time in his life. In millions of classrooms around

the world, children step up to blackboards to write things with chalk. And, of course, what could teacher do without chalk to help her?

Did you know that chalk was originally an animal? The waters of our oceans are covered with many forms of very tiny plants and animals. One of these is a one-celled animal called “Foraminifera”. The shells of these creatures are made of lime.

When these animals die, their tiny shells sink to the floor of the ocean. In time, a thick layer of these shells is built up. Of course this takes millions of years to accomplish. This layer gradually becomes cemented and compressed into a soft limestone which we call chalk.

As we know, various disturbances in the surface of the earth have often made fry land out of land that was once under water. One of the places where this happened is along the English Channel. The chalk layers at the bottom of the sea were pushed up. Later the soft parts were cut away by water, leaving huge cliffs of chalk. The two most famous ones are the chalk cliffs at Dover on the English side and at Dieppe on the French side of the Channel.

In other parts of the world, chalk deposits appear far inland in areas that were once under water. We have examples of these in Kansas, Arkansas, and Texas. But the finest natural chalk comes from England which produces more than 5,000,000 tons of it every year!

Chalk in one form or another has been used by man for hundreds of years. The blackboard chalk with which we are all familiar is mixed with some binding substance to prevent it from crumbling. The best blackboard chalk is about 95 per cent chalk. By adding pigments to it, chalk can be made in any color.

When chalk is pulverized, washed, and filtered, it is called “whiting”. It can be then used in the making of many useful products such as putty, paints, medicines, paper, and toothpastes and powders!

Ex.1 Think and answer.

1 What did chalk originate from?
2What is “foraminifera”?
3 What is lime?
4 What happens with foraminifera when they die?
5 What is limestone?

6 How can we prove that this or that part of dry land was once under water?

7 Is the blackboard chalk pure limestone?

8 What kind of material is “whiting”?

9 Where can whiting be used?

WHAT IS ASBESTOS?

Many people think asbestos is a modern invention, but it has actually been know and used for thousands of years! In ancient temples, it was used for torch wicks and to protect fires lit on the altars.

The Romans used asbestos 2,000 years ago for winding sheets to preserve the ashes of the dead when bodies were cremated. There is even a legend that Charlemagne had an asbestos tablecloth. He laundered it by putting it in the fire to burn off strains.

Asbestos is a Greek word that means “inextinguishable” or “unquenchable”. Today we apply it to a group of fibrous minerals which have the property of resisting fire. The minerals that make up asbestos differ widely in composition, and each has a different strength, flexibility, and usefulness. From the chemical point of view, asbestos usually consists of silicates of lime and magnesia and sometimes contains iron.

Because it is made up of fibers, asbestos is similar to cotton and wool, but asbestos has the added advantage of being heat- and fire-resistant. This makes it very valuable for many uses in industry, and science has not yet been able to find a substitute for it.

No other mineral we know can be spun into yarn or thread, woven into cloth, or made into sheets. Workers in plants who are exposed to risks of first sometimes wear complete outfits made of asbestos, including helmets, gloves, suits, and boots. Asbestos can withstand temperatures of 2,000 to 3,000 degrees Fahrenheit, and there are some kinds of asbestos that can even resist temperatures as high as 5,000 degrees!

Asbestos is found in veins in certain types of rocks, and sometimes it’s necessary to mine and treat as much as 50 tons of rock to produce one ton of asbestos fiber.

Ex.1 Think and answer.

1 How long has asbestos been known?
2 How was asbestos used in ancient times?
3 What is the origin of the word “asbestos”?
4 What is the most distinguished property of asbestos?
5 What minerals are included in the “asbestos group”?
6 What is the mineralogical composition of asbestos?
7 What is the chemical composition of asbestos?
8 In what way can asbestos be compared with cotton and wool?
9 Why is asbestos so valuable for industry?
10 Are there any substitute for asbestos? Why?

WHAT ARE FOSSILS?

The study of fossils is so important in helping man learn about his own past and that of animals who lived millions of years ago that it has developed into a separate science called “paleontology”.

Fossils are not, as some people think, the remains of bodies buried ages ago. Actually, there are three different kinds of fossils. The first is part of the actual body of the organism, which appears just as it was originally. But fossils may also be just the cast or mold of the shape of the body, which remains after the body of the plant or animal has been removed. And fossils may merely be the footprints or trails that animals have left as they moved over the soft muds or clays.

When a fossil is found that consists of part of the organism itself, it is usually only the hard parts, such as shells or skeletons, that are preserved. The softer parts are destroyed by decay. Yet, in some cases, even such soft-bodied animals as jellyfish, which are 99 per cent water, have left perfect fossils of themselves in rocks! And certain fossils found encased in ice not only have the skeleton preserved but also the flesh and skin on the bones.

Fossils have nothing to do with size. For instance, the fossils of tiny ants which lived millions of years ago can be found perfectly preserved in amber. The chances for animals being preserved as fossils depend mostly on where they lived. The most numerous of all fossils are water animals because when they die their bodies are quickly covered over by mud and so kept from de-

caying. Land animals and plants are exposed to the destroying action of the air and weather.

It is chiefly through the study of fossils that we know about animal life as it existed millions and hundreds of millions of years ago. For example, fossils taken from certain rocks tell us that millions of years ago there was an Age of Reptiles, with monsters so huge that they were 80 feet long and weighed 40 tons. These were the dinosaurs. And our entire knowledge about the earliest bird, called “the archaeopteryx”, is based on just two fossils of it that have been found!

Ex.1 Think and answer.

1 Why is it important to study fossils?
2 What kind of science is palaeontology?
3 What are the main types of fossils?
4 What is decay?
5 What parts of organism are preserved better?
6 Can soft-bodies animals leave fossils of themselves in rocks?
7 What are chances of animals (to) be preserved as fossils?
8 What animals are the most numerous of all fossils? Why?
9 Why are land animals worth preserved?
10 What are dinosaurs?

WHAT IS CONSERVATION?

All over the world, there are people who are waging “conservation” campaigns. Conservation means many things to many people.

To some it means preserving the wilderness in certain sections. To others it means preserving the wildlife. Conservation includes efforts to protect forests as well as the wise use of all natural resources.

The problem of conservation has arisen because mankind is using the world’s natural resources in greater quantity and variety than ever before. As the world’s population grows, and as more people live at a higher standard, there is a greater demand for resources. These resources must be “conserved” to assure that there will be enough for the future.

What do we mean by “resources”? Well, they can be divided into three basic kinds. One is renewable resources. For example, water, farmland, forests, and grazing land, even while they are being used, can be improved and renewed through good management. This would include protection from erosion, irrigation, and fertilization.

A second group of resources is not renewable. These are mainly minerals. They are used up once they are taken from the earth. These include coal, oil, and natural gas.

There are some natural resources that cannot be used up. For example, solar energy, climate, and oceans cannot be increased, decreased, or damaged by man. Man can also destroy the beauty of scenery, or cause pollution of air.

Ex.1 Think and answer.

1 What does it mean “to wage a campaign”?
2 What is “conservation campaign”?
3 What trigger the problem of conservation?
4 Why is the demand for natural resources growing?
5 What resources are considered as renewable ones?
6 How can renewable resources be protected?
7 What are non-renewable resources?
8 Are there any kind of resources which cannot be affected by Man?
9 How can Man influence natural resources?

WHAT IS AN ARTESIAN WELL?

In an artesian well, the water can leap high into the air like a geyser from its prison far below the surface of the earth. The name comes from the Artoils region in northern France where the fist European well of this kind was drilled more than 800 years ago.

Artesian wells are possible only under certain conditions. There must be a layer of porous rock or sand that is buried between two layers of solid rock impervious to water. Somewhere this porous layer must be exposed to the surface so that water falling as rain or snow will sink downward until it is trapped between the solid, watertight layers above and below.

There the great pressure on all sides holds it prisoner until man releases it. When an opening only a few inches wide is bored straight down through the solid upper strata to the sandy layer, the freed water gushes to the surface with a mighty force.

The ancient Chinese and Egyptians dug artesian wells. Some of the older European wells required six or eight years to drill. Modern machinery makes drilling today a quick and simple task.

Near Edgemont, South Dakota, two wells drilled nearly 3,000 feet deep supply some 11,000,000 gallons daily. Coming from such a depth, this water registers a temperature of 100 degrees Fahrenheit when it reaches the surface. Another well in this region spout even hotter water!

Several large cities in the United States, such as Pittsburgh, St. Louis, and Columbus, derive part, or all, of their water supply from artesian wells.

Ex.1Think and answer.

1 What kind of wells is called “artesian”?
2 What conditions are favorable for the formation of the artesian wells?
3 In what way can an artesian well be compared with a geyser?
4 What is the difference between porous and impervious rocks?
5 What is the source of artesian water?
6 How do artesian waters escape from the underground to the surface?
7 How much time did it take for ancient people to dig an artesian well?
8 Is it difficult to reach artesian waters now?
9 What is the temperature of artesian waters?
10 Where do large cities derive their water supply from?

HOW ARE CAVES FORMED?

Caves have long been kinked with the history of man in many interesting ways. We know that late in the Old Stone Age, caves were the winter dwelling place of people who had no other shelter.

But long after man stopped using caves as homes, ancient people believed many strange things about caves. The Greeks believed caves were the temples of their gods, Zeus, Pan, Dionysus, and Pluto. The Romans thought that

caves were the homes of nymphs and sibyls. The ancient Persians and others associated caves with the worship of Mithras, chief of the earth spirits.

Today, huge and beautiful caves all over the world are tourists' attractions. Caves are deep hollow places in the rocky sides of hills or cliffs. Large caves are called "caverns".

Caves are formed in many different ways. Many caves have been hollowed out by the constant beating of the sea waves against the rocks. Some caves appear under the surface of the earth. These are usually the old courses of underground streams which have worn away layers of soft rock such as limestone. Others are formed by the volcanic shifting of surface rocks, or by the eruption of hot lava.

The most common type of cave in the United States is that made by the wearing away of thick layers of limestone. This is done by action of water containing carbon dioxide. In Indiana, Kentucky, and Tennessee, feet, such caves are numerous.

Some caves have openings through their roofs, face water first gathered and seeped down. Some caves have galleries in tiers or rows, one above another. Underground streams wind through some caves, though in many cases after a cave has been formed, the streams that once flowed through it may find a lower level and leave the cave dry.

In many cases, each drop of water that drips from a cave roof contains a bit of lime or other mineral matter. As part of water evaporates, some of this matter is left behind. It gradually forms a stalactite, shaped like an icicle hanging from the roof. Water dripping from the stalactite to the floor builds up a column called "a stalagmite".

Ex.1 Think and answer.

1 How did people use caves in the Old Stone Age?
2 What did ancient people associate caves with?
3 What are caves?
4 What are caverns?
5 Where are caves formed?
6 What is the most common type of cave formation?
7 What are "sink holes"?
8 How are caves galleries formed?

9 What is a “stalactite”?
10 What is a “stalagmite”?

HOW OLD IS THE EARTH?

This is a question to which we may never have the exact answer. Man has wondered about the age of the earth since ancient times, and there were all kinds of myths and legends that seemed to have the answer. But he couldn’t begin to think about the question scientifically until about 400 years ago.

When it was proven at that time that the earth revolved around the sun (in other words, that the earth was part of our solar system), then scientists knew where to begin. To find the age of the earth, it was necessary to explain how the solar system was born. How did the sun and all the planets come into being?

One theory was called the nebular hypothesis. According to this theory, there was once a great mass of white-hot gas whirling about in space and getting smaller and hotter all the time. As the gas cloud grew smaller, it threw off rings of gas. Each of these rings condensed to form a planet, and the rest of the mass shrank into the center to become the sun.

Another explanation is called the planetesimal theory. According to this, millions and millions of years ago, there was a huge mass made up of small, solid bodies called planetesimals, with the sun at the center.

A great star came along and pulled on the sun so that parts of it broke away. These parts picked up the tiny planetesimals the way a rolling snowball picks up snow, and they became planets.

Whichever theory is right, astronomers have figured out that it all probably happened about 5,500,000,000 years ago! But other scientists besides astronomers have tackled this question.

They tried to find the answer by studying how long it took for the earth to become the way we know it. They studied the length of time it takes to wear down the oldest mountains, or the time needed for the oceans to collect the salt they now contain.

After all their studies, these scientists agree with the astronomers: The earth is about 5,500,000,000 years old!

Ex.1 Thinks and answer.

1 Do you know exactly how old the Earth is?
2 What questions were to be answered first to find the age of the earth?
3 How was the earth formed according to the nebular hypothesis?
4 How was the sun formed according to the nebular hypothesis?
5 How was the solar system formed according to the planetisimal theory?
6 What are planetisimals?
7 How old is the earth according to astronomers' views?
8 Are there any other approaches to the problem?
9 What processes and phenomena are to be taken into account when considering the age of the Earth?
10 Are there any consolidated answers?

HOW IS OIL LOCATED UNDERGROUND?

Men have developed certain fairly good methods to look for and find oil. But first, how does oil get into the ground to begin with?

Scientists think that petroleum was formed from plants and animals that lived ages ago in and around warm seas that covered much of the earth. As the plants and animals died, they piled up on the sea bottom. In time, millions of tons of sand and mud covered them. Under pressure, the mud and sand changed to rock. The plants and animals turned to a dark liquid trapped in the pores of the rock.

So when men go looking for oil, they know that it is most likely to be found in rocks that used to be the bottoms of old seas. However, oil does not collect in all these rocks. It collects in places called "traps". An oil trap consists of porous rock between layers of nonporous rock. The oil collects in tiny spaces in the rock.

The oil hunter searches for oil traps in several ways, using scientific instruments. These instruments do not actually show whether there is oil, they only help the oil hunter locate what may be an oil trap.

One of the instruments is a gravity meter. Heavy rocks pull harder, or have a greater force of gravity, than light rocks. The gravity meter gives clues to underground formations by measuring the "pull" of buried rocks.

A magnetometer, which measures variations in the earth's magnetic field, may also be used to gain information on underground rock formations. But the most widely used method for searching for oil is to make a small earthquake by setting off a charge of dynamite. When the earth's shivers, which travel faster through some types of rock than they do through others, are timed and measured.

But there is still no guarantee after all these measurements that oil will actually be found in any particular spot!

Ex.1 Think and answer.

1 What is petroleum formed from?
2 Where did ancient plants and animals live?
3 How did mud and sand change into rock?
4 Where is oil likely to be found?
5 What are traps?
6 Can an oil hunter locate oil trap?
7 How does a gravity meter work?
8 What is a magnetometer?
9 What methods are used in oil hunting?
10 Are there any guarantee that oil will actually be found in any particular spot?

HOW WERE THE OCEANS FORMED?

There are many things about our own earth that still remain a mystery to us, and one of them is how the oceans were formed.

Actually, we do not even know for sure how old the oceans are. It seems certain that oceans did not exist in they first came into being as clouds of vapor which turned into water as the earth grew cool. Estimates have been made of the ocean's age based on the amount of mineral salt in the ocean today. These estimates range between 500,000,000 and 1,000,000,000 years.

Scientists are pretty sure that most of the earth's land was covered by the sea at one time in the past. Some areas of the earth have been under water

several times. But we do not know if any part of the deep ocean ever was land, or whether any land existing today was once beneath the deep ocean.

There is a great deal of evidence to show that certain parts of the land were once the bottom of shallow seas. For example, most of the limestone, sandstone, and shale found on land were deposited sediments. The chalk that is found in England, Texas, and Kansas was deposited on the bed of a sea. It is made up of the shells of tiny creatures that sank to the ocean bed to form what we call chalk.

Today, the waters of all the oceans cover nearly three-quarters of the surface of the earth. While there are many great ocean areas where man has not yet explored the bottom or taken soundings, we have a good, rough idea of what the bottom is like. There are sections that are like mountains ranges, and there are plateaus and plains. But the ocean bottom is not as varied as the surface of the continents.

Ex.1 Think and answer.

1 Do we know for sure how the oceans were formed?
2 Do we know for sure how old the oceans are?
3 What do we know for certain?
4 How could the scientists estimate the ocean's age?
5 How can we prove that certain parts of the land were once under the water?
6 Can we prove that any part of ocean ever was land?
7 How does chalk form?
8 How much of the earth's surface is now occupied by the oceans?
9 How can the bottom of the great oceans be studied?
10 How does the relief of the ocean bottom look like?

LONDON FOGS

Because of its geographical position in a deep river valley London is occasionally enveloped by unusually thick fog. The worst of these fogs began on 4th December, 1952 and there was a similar one in December, 1963. All traffic was forced to a standstill as visibility fell to nil. The streets near the centre

of London were jammed with buses crawling along at two miles per hour. Before long all had stopped. Drivers abandoned buses and cars. People who usually travelled by road decided to take the underground with the result that the entrances had to be closed to prevent crushing. People caught in the fog literally felt their way with one hand along the walls of buildings, holding the other out before them to avoid colliding with other people. At Covent Garden a performance had to be abandoned after the first act because so much fog had penetrated into the house that the audience could no longer see the singers clearly. It was a terrible fog and caused the death of some 4,000 people in London.

As a matter of fact this deadly kind of fog is called by Londoners “smog”. It is the kind of fog you get only in towns – particularly in the industrial areas. It is a mixture of smoke and fog together and it is dangerous and deadly especially for people who are suffering from any kind of respiratory troubles. In the big towns and cities you get very much smoke, it is concentrated because it doesn’t come from household chimneys only, but from all factories too. This is the stuff that does most of the damage because it contains so much different chemicals which, when we breathe in add as irritants to the whole of the respiratory system. Even the ordinary fog is pretty nasty.

Ex.1 Suggest a suitable title for each paragraph of the passage.

Ex.2 Express the main idea of each paragraph in a single sentence in English.

CRATERS OF THE MOON

The dominant *surface features* of the Moon are nearly circular craters which most American specialists believe are chiefly the result of meteoroid impact. Some of the large basins now filled with dark material are believed to have been formed by *impact* of bodies of asteroidal size. Infall of meteoroids has probably been *going on* throughout lunar history. Even though erosion by water changed the *appearance* of the older craters with respect to the younger ones. This change can probably *be attributed* to such factors as solar radiation, extreme temperature changes, micro-meteorite bombardment, Moon-

quakes, and burial of older features with thin layers of material *ejected* from younger craters.

Three general classes of craters may be recognized. Those which are at the foci of bright radiating streaks, called ray craters, are the most *conspicuous* craters on lunar surface at full moon. The rays are believed to be *discontinuous* layers of highly reflective material *derived* primarily from the craters from which they radiate. These are among the youngest craters on the Moon. Although the rays show up under high sun, they are rarely visible at very low sun. At low sun the topographic details of the craters are clearly visible.

Craters of Class II *exhibit* topographic features at low sun similar to those of Class I, but under high sun exhibit no ray patterns. The rays evidently darken and disappear with time and craters of Class II are older than ray craters. As the craters become older even talus slopes apparently stabilize and darken as light bands are *rarely visible* in the oldest craters.

Craters of Class III, the oldest, have been considerably *modified* and their walls have been dissected. In many places younger craters are superimposed upon them. Under high sun these old craters can be seen only with difficulty.

A sequence of craters exhibiting progressively modified features can be recognized that spans the range of ate from bright young ray craters to the oldest recognizable craters. The classification of lunar craters by age leads to certain inferences concerning the geologic history of the Moon.

Ex.1 Arrange the words to form a sentence.

1. classify, craters, scientists, into three general classes. 2. at full noon, ray craters, on lunar surface, are the most conspicuous craters. 3. at low sun, craters of Class II, topographic features, exhibit. 4. can be seen , under high sun, old craters, with great difficulty.

Ex.2 Answer the questions in short simple sentences. Your paragraph should not exceed 120 words.

1. What are the dominant surface features of the Moon? 2. How are these craters believed to have been formed? 3. Is the appearance of all the craters identical? 4. What factors can the change in the appearance of craters be attributed to? 5. What are the most conspicuous craters on lunar surface?

HOW IS SOIL FORMED?

If the surface of our earth were not covered with soil, man would perish. Without soil, plants could not grow and human beings and other animals would have no food.

Soil is the loose, powdery earth in which plants grow. It is made up of very small pieces of rock and decayed plant and animal materials. The small pieces or particles of rock were once parts of larger rocks. The plant and animal materials come from plant and animal bodies.

No rock is so hard that it cannot in time be broken into pieces. The crumbling and wearing away of rock, which is called “weathering”, goes on all the time and is done in many ways. Glaciers push great piles of rocks ahead of them as they move along and this pushing and grinding help crumble the rocks.

Water with chemicals in it will dissolve and wear away some kinds of rocks. Changes in temperature often help break rocks into small pieces. The heating and cooling of rocks may cause cracks to appear. Water gets into the cracks, freezes, and cracks the rocks even more. Even plant roots may cause rocks to break. Sometimes the seeds of trees fall into cracks in rocks, the seeds sprout, and as the roots of the plant grow, they help split the rock. Wind also helps crumble rocks by hurling sand against the rocks.

But this is only the beginning of soil-making. To make real soil, the sand or fine particles of rock must have “humus” added to it. Humus is an organic material that comes from plants and animal bodies. The bodies of almost all dead land plants and animals become a part of soil, through the work of bacteria.

Bacteria cause the plants and animals to decay and make the soil fertile. Earthworms and many kinds of insects help to make the soil rich. The richest layer of soil is at the top and is called “topsoil”. This has much humus in it. The next layer, which is called “subsoil”, contains mostly bits of rock. The layer beneath is bedrock, which is under the soil everywhere.

Ex.1 Think and answer

1 Why is soil so important for man?
2 What is soil?

3 What is the composition of soil?
4 What is weathering?
5 How do glaciers work?
6 How does temperature help break rocks?
7 How does water help weathering?
8 How do plant roots cause rocks to break?
9 How do seeds help split the rocks?
10 What components are needed to make soil fertile?

HOW WERE THE MOUNTAINS FORMED?

Because mountains are so big and grand, man thinks of them as unchanging and everlasting. But geologists, the scientists who study mountains, can prove that mountains do change, and that they are not everlasting.

Certain changes in the earth's surface produced the mountains, and they are constantly being destroyed and changed. Boulders are broken from mountain sides by freezing water; soil and rock particles are carried away by rain wash and streams. In time, even the highest mountains are changed to rolling hills or palins.

Geologists divide mountains into four classifications, according to how they were formed. All mountains, however, are the result of violent changes in the earth's surface, most of which happened millions of years ago.

Folded mountains were made of rock layers, squeezed by great pressure into large folds. In many places in such mountains, you can see the rock layers curving up and down in arches and dips, caused by the squeezing and pressure on the earth's surface. The Appalachian Mountains and the Alps of Europe are examples of folded mountains. In dome mountains, the rock layers were forced up to make great blister-like domes. In many cases, molten lava, coming with great pressure from below the earth's surface, lifted these rock layers. The Black Hills of South Dakota are examples of dome mountains.

Block mountains are the result of breaks, or faults, in the earth's crust. Huge parts of the earth's surface, entire "blocks" of rock, were raised up or titled at one time. The Sierra Nevada Range of California is a block that is 400 miles long and 80 miles wide!

Volcanic mountains are built of lava, ash, and cinders poured out from within the earth. The usual volcano is cone-shaped with a large hole, or

crater, at the top. Among the famous volcanic mountains are Mounts Ranier, Shasta, and Hood in the United States, Fujiyama in Japan, and Vesuvius in Italy. Many mountain ranges have been formed by more than one of the ways described. In the Rockeries are mountains made by folding, faulting, doming, and even erosion of lava!

Ex.1 Think and answer

1 Are the mountains always stable?
2 How do mountains change?
3 How can mountains be classified?
4 What is weathering?
5 How do glaciers work?
6 What are folded mountains?
7 Why are the rock layers curved up and down in some mountains?
8 What are “dome mountains”?
9 What are “block mountains”?
10 How are volcanic mountains formed?
11 What processes make up the mountains?
12 What is faulting? Folding? Doming?

WHY DO WE STILL HAVE GLACIERS TODAY?

The great ice mass that began the Ice Age in North America has been called “a continental glacier”; it may have been about 15,000 feet thick in its center. This great glacier probably formed and then melted away at least four times during the Ice Age. The Ice Age or glacial period that took place in other parts of the world still has not had a chance to melt away! For instance, the big island of Greenland is still covered with a continental glacier, except for a narrow fringe around its edge. In the interior, this glacier, often reaches heights of more than 10,000 feet high in places!

So the reason we still have glaciers in certain parts of the world is that they have not bad a chance to melt away since the Ice Age. But most of the glaciers that exist today have been formed in recent times. These glaciers are usually the valley type of glacier.It starts in a broad, steep-walled valley shaped

like a great amphitheatre. Snow is blown into this area or slides in from avalanches from the slopes above. This snow doesn't melt during the summer but gets deeper year by year. Eventually, the increasing pressure from above, together with some melting and refreezing, forces the air out of the lower part of the mass and changes it into solid ice. Further pressure from the weight of ice and snow above eventually squeezes this mass of ice until it begins to creep slowly down the valley. This moving tongue of ice is the valley glacier.

There are more than 1,200 such glaciers in the Alps of Europe! Glaciers are also found in the Pyrenees, Carpathian, and Caucasus Mountains of Europe, and in southern Asia. In southern Alaska, there are tens of thousands of such glaciers, some from 25 to 50 miles long!

Ex.1 Think and answer.

1 What kind of glacier caused the Ice Age in North America?
2 How did it change during the Ice Age?
3 Are there any traces of the Ice Age now?
4 What is a continental glacier?
5 What is a valley glacier?
6 Which type of glacier is older: valley or continental?
7 Where does a valley glacier originate?
8 How is snow changed into solid ice?
9 Is the valley glacier stable?
10 How are glaciers distributed?

WHY IS THE OCEAN SALTY?

Every now and then, we come across a fact about our earth which mystifies us and for which no answer has yet been found. Such a fact is the existence of salt in the oceans. How did it get there?

The answer is we simply don't know how the salt got into the ocean! We do know, of course, that salt is water-soluble, and so passes into the oceans with rain water. The salt of the earth's surface is constantly being dissolved and is passing into the ocean. But we don't know whether this can account for the huge quantity of salt that is found in oceans. If all the oceans were

dried up, enough salt would be left to build a wall 180 miles high and a mile thick. Such a wall would reach once around the world at the Equator! Or put another way, the rock salt obtained if all the oceans dried up would have a bulk about 15 times as much as the entire continent of Europe!

The common salt which we all use is produced from deposits of rock salt. The concentration of salt in sea water ranges form about three per cent to three-and-one-half per cent. Enclosed seas, such as the Mediterranean land the Red Sea, contain more salt in the water than open seas. The Dead Sea, which covers an area of about 340 square miles, contains about 11,600,000,000 tons of salt!

On the average, a gallon of sea water contains about a quarter of a pound of salt. The beds of rock salt that are formed in various parts of the world were all originally formed by the evaporation of sea water millions of years ago. Since it is necessary for about nine-tenths of the volume of sea water to evaporate for rock salt to be formed, it is believed that the thick rock-salt beds that are found were deposited in what used to be partly enclosed seas. These evaporated faster than fresh water entered them, and the rock-salt deposits were thus formed.Most commercial salt is obtained from rock salt. The usual method is to drill wells down to the salt beds. Pure water is pumped down through a pipe. Water dissolves the salt and it is forced though another pipe up to the surface.

Ex.1 Think and answer.

1 What property of salt can account for its existence in the oceans?
2 How does salt get into the ocean?
3 What is the amount of salt on Earth?
4 What is the common salt?
5 What are the sources of the common salt?
6 Why do enclosed seas contain more in water than open seas?
7 What is the origin of beds of rock salt on the surface of the Earth?
8 What is commercial salt?
9 How is commercial salt obtained?

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